WE CLAIM:

1. A complete polarimeter analyzer, comprising:

a prismatic lens having a tetrahedron surface, each surface operably configured to perform a division of aperture by diffraction with respect to an optical axis of an image;

a vertical linear polarization analyzer layer having a first orientation and affixed to one of the tetrahedron surfaces;

a 45 degree linear polarization analyzer layer having a second orientation rotated 45 degrees with respect to the first orientation and affixed to a second of the tetrahedron surfaces;

a horizontal linear polarization analyzer layer having a third orientation rotated 90 degrees with respect to the first orientation and affixed to a third of the tetrahedron surfaces; and

a right circular polarization analyzer layer affixed to a fourth of the tetrahedron surfaces.

2. A spectropolarimeter, comprising:

an input stage operably configured to collimate an image along an optical axis;

a prismatic lense aligned with the optical axis and operably configured to perform division of aperture by refraction of the collimated image into a plurality of offset images;

a plurality of polarization analyzers, each analyzer aligned with a respective one of a plurality of polarization states;

a two-dimensional dispersive member preceeding the reimaging lens;

a reimaging lens operable to reimage the analyzed plurality of offset and diffracted images; and

a focal plane array to sense the diffraction images from the dispersive member.

3. The spectropolarimeter of claim 2, further comprising:

a memory;

a processor configured to perform a program resident in the memory, the program configured to calculate the complete polarization exitance for each voxel of the image.

4. A method of measuring complete spectral content of an image, the method comprising:

collimating an image along an optical axis;

performing division of aperture by refraction of the collimated image into four angularly offset images;

polarization analyzing each offset image with a selected polarization state analyzer;

two dimensionally diffractively dispersing the analyzed offset images and reimaging each analyzed and diffractively dispersed offset image onto a focal plane as a set of interleaved diffraction orders.

5. The method of claim 4, wherein the two dimensionally diffractively dispersing further comprises interleaving each set of polarization analyzed diffraction orders.

6. The method of claim 4, further comprising calculating the complete polarization exitance for each voxel of the image.

7. The method of claim 6, wherein calculating the complete polarization exitance for each voxel of the image further comprises:

calibrating by measuring the set of diffraction orders in response to a calibration image having a known spatially-limited, spectrally-limited, and polarimetrically-limited content and by calculating a calibration matrix for each voxel;

obtaining sets of diffraction orders from an image of unknown content;

estimating a data cube for each polarization basis by use of the Expectation Maximization algorithm; and

obtaining Stokes parameters for each voxel of the image by multiplying an inverse matrix of the calibration matrix corresponding to the selected voxel.